

III. Remarks

The Official Action of March 25, 2009 has been thoroughly studied. Accordingly, the changes presented herein for the application, considered together with the following remarks, are believed to be sufficient to place the application into condition for allowance.

By the present amendment each of claims 1, 9 and 9-12 have been amended to recite a number average molecular weight of 400-1,000 for the α -olefin oligomer.

This change recites applicants' preferred disclosed in paragraph [0020] of applicants' original specification.

This change presents a lower average molecular range that is believed to more clearly distinguish over the average molecular weight of 287 which is presented in applicants' comparative Example 4 as producing poor results, including volatilization at the cross-linking and the physical properties that are not stabilized, and particularly due to volatilization at the heat aging the change in hardness is large.

From these results applicants have determined that α -olefin oligomers having a Mn value of less than 300 undergoes volatilization at the cross-linking or heat aging, resulting in considerable deterioration of physical properties and that α -olefin oligomers having a Mn value of greater than 300 avoid these problems. The point being that there is a criticality associated with a Mn value of 300.

The presently claimed number average molecular weight of 400-1,000 for the α -olefin oligomer with a lower limit of 400 is believed to more clearly distinguish over the prior art and encompass an average molecular weight that provides results that are not

found in or otherwise obvious over the prior art (unexpected) and which therefore establish a criticality that patentably distinguishes over the prior art.

Entry of the changes to the claims is respectfully requested.

Claims 1-6 and 9-12 are pending in this application.

Claims 1-6 and 9-12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0068797 to Ikemoto et al. in view of U.S. Patent Application Publication No. 2004/0106723 to Yang et al. and U.S. Patent Application Publication No. 2004/0226393 to Hong.

For the reasons set forth below, it is submitted that each of the pending claims are allowable over the prior art of record and therefore, the outstanding rejection of the claims should properly be withdrawn.

Favorable reconsideration by the Examiner is earnestly solicited.

The Examiner has relied upon Ikemoto et al. as disclosing:

...a rubber composition comprising 1) a rubber compound composed of at least one of an ethylene-propylene-diene (EPDM) terpolymer and an ethylene-propylene (EPM) copolymer, 2) a peroxide vulcanizing agent, 3) a resorcinol-based compound, and 4) a melamine resin (§10008-0011) (claims 1, 2). Example 1 of Ikemoto discloses a rubber composition comprising 100 parts of ESPRENE 501A, an EPDM rubber having a Mooney viscosity (ML 100°C) of 43 and comprising 50% ethylene, 4% diene, and, by extension, 46% propylene and 4.2 parts di-t-butyl peroxy-diisopropylbenzene as a peroxide vulcanizing agent (§10038) (claims 1, 2). Example 7 of Ikemoto discloses a rubber composition prepared in a manner similar to Example 1, except ESPRENE 201, an EPM rubber having a Mooney viscosity (ML 100°C) of 43, was used instead of EPDM. Ikemoto teaches that the rubber compositions of US20020068797 may be used as rubber vibration insulators (§10036).

As stated above, Ikemoto recites that the rubber compound is composed of at least one of EPDM and EPM; Ikemoto therefore teaches the use of a rubber composition comprising a blend of EPDM and EPM. The examiner therefore takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to prepare a blend rubber comprising ESPRENE 501A and ESPRENE 201 to prepare a rubber composition as described in US20020068797 (claim 2).

Hong has been relied upon as disclosing a conventional crankshaft that is equipped with a damper pulley.

The Examiner concedes that:

Ikemoto and Hong are both silent regarding the addition of a C₈-C₁₂ α -olefin oligomer having a number average molecular weight of 300-1400 to EPDM/EPM.

The Examiner has relied upon Yang et al. as disclosing:

...the use of oligomers of C₆ to C₁₄ α -olefins (claims 1, 2) (§0077) having a number average molecular weight in the range of **100-21,000** (claims 1, 2) (§0079) as a non-functional plasticizer (NFP) for polyolefin homopolymers and copolymers (§0002, 0039). Yang discloses that the polyolefin is present in the final composition at levels from 40 to 99.9% by weight, based on the total weight of polyolefin and NFP; by extension, the composition comprises 0.1 to 60% by weight of the NFP (claims 1, 2) (§0043). Yang discloses that the addition of the NFP results in a polymer composition having improved properties (§0007-0008).

The Examiner further states:

Ikemoto teaches that the polymer composition of US2002/0068797 may contain additives (§0033-0034). As taught by Yang, it was known in the art to use low molecular weight oligomers of C₆ to C₁₄ α -olefins as plasticizers for polyolefin copolymer.

The Examiner therefore takes the position that:

...it would been obvious....to modify the damper rendered obvious by the combination of Ikemoto and Hong by adding 1-60% by weight of a C₆ to C₁₄ α -olefins having Mn of 100 to 21,00 to the EPDM/EPM composition, for the purpose of obtaining a damper having improved properties, as taught by Yang.

In the Final Rejection the Examiner has stated:

As noted by applicant in the remarks (see page 11), Yang discloses the Mn of the oligomer additive falls within the broad range of 100-21,000; Yang further discloses the narrower range of 200-500 for some embodiments of said oligomer. The mere fact that the lower limit of 200

disclosed by Yang is less than the claimed lower limit of 300 does not teach away from the use of the overlapping portion of the prior art range and the claimed range. Applicant argues that the statement in the specification that oligomers having Mn less than 300 are not suitable for use in the claimed invention establishes the criticality of the claimed range; this is not persuasive. Applicant has not provided factual evidence to substantiate this allegation. Applicant's specification only compares the effects of the use of an oligomer having Mn of 690 (Examples 1-3) to oligomers having Mn of 287 (Comparative Example 4) or 2000 (Comparative Example 5). Applicant has not established that unexpected results are obtained commensurate in scope with the claimed range.

While the Examiner is comparing applicants' disclosed and claimed invention to the prior art it is important to remember that 35 U.S.C. §103(a) requires consideration as to:

...if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious...(Emphasis added)

The "subject matter as a whole" of the present invention includes the structural features of applicants' damper, the composition of the elastic body and the unique vibration absorbing properties and characteristics that are discussed in applicants' paragraphs [0014], [0028], [0038], *et seq.*

Hong teaches a crankshaft having a damper, but does not disclose the composition of applicants' claimed elastic body or the advantages or properties associated therewith.

Ikemoto et al. teach eliminating the need of an adhesive layer/composition in the fabrication of automobile hoses which involves the use of a composition that comprises: (a) a rubber composed of EPDM and EPM; (b) a resorcinol-based compound; and (c) a melamine resin.

The resorcinol-based compound functions as an adhesive and the melamine resin functions as an adhesive adjuvant.

As noted above the Examiner has relied upon Yang et al. as teaching:

...the use of oligomers of C₆ to C₁₄ α-olefins (claims 1, 2) (¶0077) having a number average molecular weight in the range of 100-21,000 (claims 1, 2) (¶0079) as a non-functional plasticizer (NPF) for polyolefin homopolymers and copolymers (¶0002, 0039).

In order to distinguish over the combination of Ikemoto et al., Yang et al. and Hong, independent claims 1 and 2 has been amended herein to recite that R in the formula CH₂=CHR (applicants' α-olefin oligomer) is an alkyl group having 6-10 carbon atoms, with a Mooney viscosity of 40-110 and a number average molecular weight Mn of 400-1,000.

As noted, and relied upon by the Examiner, Yang et al. teaches of oligomers of C₆ to C₁₄ α-olefins having a number average molecular weight in the range of 100-21,000.

On page 4 of the Office Action of December 15, 2009 under the *Response to Arguments* section the Examiner has cited *In re Wertheim* (191 USPQ 90 (CCPA 1976)) as holding that obviousness can be found in overlapping ranges.

The Examiner's reliance upon *In re Wertheim* comes from MPEP 2144.05. This section of the MEPE includes the statement that:

Applicants can rebut a prima facie case of obviousness based on overlapping ranges by showing the criticality of the claimed range. (See *In re Woodruff*, 16 USPQ2d 1934 (Fed. Cir. 1990)).

In paragraph [0021] of applicants' original specification is it disclosed:

α-olefin oligomers having an Mn value of less than 300 undergoes volatilization at the cross-linking or heat aging, resulting in considerable deterioration of physical properties.

Thus applicants' have disclosed a criticality of an Mn value of at least equal to or greater than 300 and presently claim a lower Mn value of 400.

As held by the CAFC in *In re Soni*:

When an applicant demonstrates substantially improved results and states that the results are unexpected, this should suffice to establish unexpected results in the absence of evidence to the contrary. (34 USPQ 2d 1684 (CAFC 1995))

Applicants have established a criticality in the Mn value and have stated and disclosed that the lower limit is 300. Absent evidence to the contrary the Examiner is respectfully requested to accept applicants' disclosure of this criticality, particularly when considering applicants are now claiming a lower limit of 400 which is even above applicants' critical lower limit (and therefore further distinguishes over the prior art).

In contrast to applicants' claimed invention, in paragraph [0079] Yang et al. disclose:

PAO's useful in the present invention typically possess a number average molecular weight of from 100 to 21,000 in one embodiment, and from 200 to 10,000 in another embodiment, and from 200 to 7,000 in yet another embodiment, and from 200 to 2,000 in yet another embodiment, and from 200 to 500 in yet another embodiment.

As can be seen, while Yang et al. disclose Mn ranges that progressively limit the upper limit, Yang et al. maintains a lower Mn limit that is 200. This clearly means Yang et al. confirm that this limit is suitable for the invention disclosed in Yang et al.

Inasmuch as applicants specifically exclude a lower Mn of 200 and further teach a criticality associated with a lower Mn of 400, it is submitted that under the provisions of MPEP 2144.05, the teachings of Yang et al. cannot be relied upon as rendering applicant's claimed invention obvious.

Thus the combination of Ikemoto et al., Yang et al. and Hong does not render applicants' claimed invention obvious under 35 U.S.C. §103.

On page 5 of the Office Action the Examiner has pointed out:

...Yang discloses examples wherein commercially available α -olefin oligomers are used as plasticizers by without the addition of paraffinic plasticizer (see ¶0352 Table 6, Samples 7-9). The difference between the claimed invention and prior art therefore is not the addition of an α -olefin oligomer instead of a paraffinic plasticizer; rather, the difference is the selection of the overlapping portion of the claims M_n range and the prior art M_n range as discussed above.

It is important to note that Yang et al. only describe a terpolymer of propylene, ethylene and C_4 to C_{20} α -olefin as a propylene copolymer to which such an α -olefin oligomer is added (See paragraph [0132]). There is no description found that a diene can be copolymerized in Yang et al.

This means that Yang et al. does not teach or suggest that EPDM is used as a propylene copolymer.

Keeping this difference between Yang et al. and the present invention in mind it is submitted that applicants' are claiming a damper (not merely a composition) having a structure that includes a vibration body, a mass member and an elastic body of a specific composition, through which the mass member is joined to the vibration body. This arrangement effectively controls vibrations of a rotating shaft, e.g. a crankshaft of an engine, over a temperature range of from about -30°C to about 100°C , and which can attain a vibration isolation effect at -30°C so that the shaft input torque which can tend to loosen a center bolt is prevented from occurring. Further the vibration characteristics in the low-temperature region are improved without impairing the vibration isolation effect over the normal use temperature region, thereby reducing vibrations and noise.

The effect of applicants' invention are demonstrated in applicants' working examples and highlighted as having an evaluation of percent change in resonance frequency at -30°C/60°C in Examples 1 to 3 that were rated less than 65% (rated "good," see paragraph [0028]).

Further Examples 1 to 3 demonstrate a temperature dependency of spring constant that is very satisfactory in a range from low-temperature region up to normal use temperature region, and damping characteristics at normal use temperatures that are satisfactory, and a consequent suppression of vibration amplification at resonance point that leads to high durability (See Fig. 5).

When comparing the features and characteristics of applicants' damper with the prior art, it is submitted that the prior does not suggest the features and characteristics associated with and provided by applicants' invention.

That said, the fact that Yang et al. does not teach or suggest that EPDM is used as a propylene copolymer and the fact that the prior art taken alone or in combination does not provide EPDM that is composed of an α -olefin oligomer, neither applicants' claimed structure nor the unique properties and characteristics of the claimed structure can properly be found obvious over the prior art.

It is further noted that Yang et al. teaches a resin material (plasticized polyolefin composition) and there is no motivation to apply teachings of such a material to the rubber material of Ikemoto et al. Therefore, there is no motivation or obvious manner of combining the teaches of these references.

Even if the teachings of Ikemoto et al. and Yang et al. were combined as the Examiner suggests, the α -oligomer and P/E ratio of EPDM are inevitably linked in a relationship that is discussed in applicants' paragraph [0038]. That is, as disclosed, the

low temperature characteristics are not improved unless the P/E ratio and additive amount of α -oligomer are balanced. Unless it is known that the α -oligomer has an effect of improving the low temperature characteristics, this improvement discovered and achieved by applicants is unknown and actually unexpected.

There is no teachings in either Ikemoto et al. or Yang et al. of balancing or adjusting the α -oligomer and P/E ratio to improve low temperature characteristics and obtain the results of applicants' claimed invention.

Therefore applicants' invention and the particular low temperature characteristics of applicants' elastic body and the affect these low temperature characteristics have on the claimed damper are not obvious over (or even apparent or appreciated by) Ikemoto et al. and Yang et al.

The Examiner has asserted that the claims do not reflect that the amount of α -oligomer added depends on the P/E ratio of the EPDM.

However, in claims 9 and 11 and claimed 10 and 12 the amount of α -oligomer varies depending on the P/E ratio of the EPDM. That is the amount of α -oligomer becomes lower (5-15 parts by weight in claims 9 and 11) as the P/E ratio becomes higher (46.7-50). In contrast, the amount of α -oligomer becomes greater (15-50 parts by weight in claims 10 and 12) as the P/E ratio becomes lower (43.3-35) .

Thus, the α -oligomer and P/E ratio are clearly linked in a relationship according to the present invention as disclosed and claimed.

Therefore it is submitted that even if Ikemoto et al. and Yang et al. were combined, there is no teaching in these references as to how to balance the α -oligomer to P/E ratio according to the present invention to achieve improved or acceptable low temperature characteristics.

Further it is submitted that applicants' claims reflect the relationship that applicants alone have found link low temperature characteristics to the α -oligomer to P/E ratio.

Based upon the above distinctions between the prior art relied upon by the Examiner and the present invention, and the overall teachings of prior art, properly considered as a whole, it is respectfully submitted that the Examiner cannot rely upon the prior art as required under 35 U.S.C. §103 to establish a *prima facie* case of obviousness of applicants' claimed invention.

It is, therefore, submitted that any reliance upon prior art would be improper inasmuch as the prior art does not remotely anticipate, teach, suggest or render obvious the present invention.

It is submitted that the claims, as now amended, and the discussion contained herein clearly show that the claimed invention is novel and neither anticipated nor obvious over the teachings of the prior art and the outstanding rejection of the claims should hence be withdrawn.

Therefore, reconsideration and withdrawal of the outstanding rejection of the claims and an early allowance of the claims is believed to be in order.

It is believed that the above represents a complete response to the Official Action and reconsideration is requested.

Conclusion

It is believed that the above represents a complete response to the Official Action and reconsideration is requested.

If upon consideration of the above, the Examiner should feel that there remain outstanding issues in the present application that could be resolved; the Examiner is invited to contact applicants' patent counsel at the telephone number given below to discuss such issues.

To the extent necessary, a petition for an extension of time under 37 CFR §1.136 is hereby made. Please charge the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 23-1925 and please credit any excess fees to such deposit account.

Respectfully submitted,

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